

CLAIMS

1. A blood filter device comprising:

5 a housing that comprises a dome portion forming an upper part of the housing, a filter retaining portion forming a middle part of the housing, and a bottom portion forming a lower part of the housing;

an inlet provided on a lateral portion of the dome portion so as to allow blood to flow into the dome portion horizontally and along an inner wall of the dome portion;

10 an air vent provided at a top of the dome portion;

a filter for filtering a foreign substance in the blood, the filter being disposed in the filter retaining portion; and

an outlet for the blood, the outlet being provided in the bottom portion,

15 the blood filter device being configured so that the blood flows into the dome portion from the inlet, passes through the filter retaining portion, and then flows out from the outlet,

wherein the filter is formed of a sheet-like filter member that has been folded so as to have a plurality of pleats with enveloping surfaces connecting top ends of the respective pleats being flat so that the filter as a whole has a plate-shaped outer shape, and the filter is arranged so as to partition a cavity of the housing into a dome portion side and a bottom portion side.

25 2. The blood filter device according to claim 1, wherein a space between an inner side wall of the filter retaining portion and an outer peripheral portion of the filter is filled with a resin so as to be sealed, and the filter is fixed to the inner side wall of the filter retaining portion with the resin.

30 3. The blood filter device according to claim 1 or 2, wherein a ratio h/r of a

height h of the dome portion to an inner diameter r of the dome portion on a filter retaining portion side is in a range from 0.26 to 1.06.

4. The blood filter device according to claim 3, wherein the ratio h/r is in a
5 range from 0.44 to 0.91.

5. The blood filter device according to claim 1 or 2, wherein a ratio d/r of a
depth d of the bottom portion to an inner diameter r of the bottom portion on
a filter retaining portion side is in a range from 0.11 to 0.30.

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6. The blood filter device according to claim 1 or 2, wherein an inner
diameter r of the dome portion on a filter retaining portion side is 27 to 33
mm, and a height h of the dome portion is 7 to 35 mm.

15 7. The blood filter device according to claim 6, wherein the height h of the
dome portion is 12 to 30 mm.

8. The blood filter device according to claim 6, wherein a depth d of the
bottom portion is 3 to 10 mm.

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9. The blood filter device according to claim 6, wherein a distance between
adjacent pleats of the filter is 1.6 to 3.7 mm, and a height of each pleat is 5 to
30 mm.

25 10. The blood filter device according to any one of claims 1 to 9, wherein the
filter is formed only of a filter member having a function of filtering the
foreign substance.

11. The blood filter device according to claim 1, wherein the filter retaining
30 portion has a cylindrical cavity whose cross section taken in a horizontal

direction is circular.

12. The blood filter device according to claim 1, wherein an outer peripheral
length of an internal space of the dome portion is reduced toward the top of
5 the dome portion.

13. The blood filter device according to claim 1, wherein an inner surface of
the bottom portion has no recess or protrusion.

10 14. A method for producing a blood filter device,
the blood filter device comprising:

15 a housing that comprises a dome portion forming an upper
part of the housing, a filter retaining portion forming a middle
part of the housing, and a bottom portion forming a lower part of
the housing;

an inlet provided on a lateral portion of the dome portion so as
to allow blood to flow into the dome portion horizontally and
along an inner wall of the dome portion;

20 an air vent provided at a top of the dome portion;

a filter for filtering a foreign substance in the blood, the filter
being disposed in the filter retaining portion; and

an outlet for the blood, the outlet being provided in the bottom
portion,

25 the blood filter device being configured so that the blood flows
into the dome portion from the inlet, passes through the filter
retaining portion, and then flows out from the outlet,

the method comprising:

30 forming the filter by folding a sheet-like filter member so as to have a
plurality of pleats with enveloping surfaces connecting top ends of the
respective pleats being flat so that the filter as a whole has a plate-shaped

outer shape;

disposing the filter in a cavity of the filter retaining portion of the housing so that the flat enveloping surfaces extend horizontally; and

filling a space between an inner side wall of the filter retaining
5 portion and an outer peripheral portion of the filter with a resin while
applying a centrifugal force that is caused by rotation around a center of the
filter retaining portion and acts horizontally and then hardening the resin,
thereby fixing the filter to the inner side wall of the filter retaining portion
with the resin.

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15. The method according to claim 11, wherein holding ribs that extend
vertically are provided at positions on the inner side wall of the filter
retaining portion corresponding to end portions of the respective pleats, and
when disposing the filter in the cavity of the filter retaining portion,
15 the end portions of the pleats are inserted to the holding ribs, respectively, so
that the filter is temporarily held by the inner side wall of the filter retaining
portion.

16. The method according to claim 14 or 15, wherein, for forming the
20 housing, an upper half and a lower half that are to be joined to each other so
that a joint between the upper half and the lower half is in the filter retaining
portion of the housing are provided,

the filter is disposed in a portion corresponding to the cavity of the
filter retaining portion in one of the upper half and the lower half, and the
25 other one of the upper half and the lower half is joined to the one of the upper
half and the lower half, and thereafter,

the sealing and the hardening of the resin are performed.